

THREE CLOSELY RELATED ACACIAS OF SOUTHERN AFRICA.

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I. COMPARATIVE STUDY OF THE THREE SPECIES CONCERNED.

The thorny South African Acacias have been, for more than a century, a rather thorny problem for the taxonomist. In particular, *A. natalitia* and *A. hirtella*, i.e. the species nearly related to *A. karroo*, offer great difficulty in verification for the botanist who has only herbarium specimens for his guidance. The primitive Zulu, with his veld experience, who recognizes the tree from afar by its particular shape and habitat, and who is more interested in the timber and bark and in the ability of regeneration of the tree after veld fires, etc., has since ancient times a much clearer idea of these Acacias than we Europeans with our magnifying lenses. He distinguishes well between the three species known to him in hundreds of cases as "umuNga," i.e. *A. karroo* Hayne, "umSama," i.e. *A. natalitia* E. Mey, and "isiKhombe," i.e. *A. inconflagrabilis* Gerstner, a new species described at the end of this paper, which has hitherto been overlooked or confused with the first two.

These three species do not possess the usual stipules but instead of them straight, whitish, twin spines, which we have to consider as transformed stipules. These spines, in the case of *A. karroo* at least, are often inflated, confluent and infested by a certain species of black ant, *Cataulacus rugosus*, which lay their eggs in cavities which they make in the young soft thorns.

The flowers, which vary from 1—6 in number, are produced in fascicles or spurs in the axils of the present or later developed leaves. They are arranged in globose flower-heads of 10—12 mm. diameter and are of a bright yellow colour, like the yolk of an egg.

Different kinds of beetles (Lamellicornia) and other insects effect cross-pollination. This seems to be necessary, because isolated plants often bear no fruits. The seeds are distributed by ruminants eating the pods. Wild game animals, such as duikers, do not swallow the seeds, but cattle swallow them. They do not, however, digest the very hard seeds,

which are merely stimulated in the digestive tract. No wonder that all these species of *Acacia* frequently become a pest on cattle farms of the thorn- and lowveld.

The pods, seeds, flowers, leaves and spines of all these three species vary considerably, but are very much alike, inter se, and, therefore, of very little taxonomic value. Of more systematic value are the complete inflorescences, in their form and way of developing. All three species have the flowers arranged in axillary spurs, i.e. fascicles of 1—6 in the axils of the leaves. *A. karroo* and *A. natalitia* seem to produce apical and lateral inflorescences. But these apical inflorescences are false ones because the subtending leaves always develop later on. The inflorescences of *A. karroo* are also the densest (densiflorous); those of *A. inconflagrabilis* are laxiflorous and those of *A. natalitia* more or less intermediate between the others.

The leaflets (pinnae), if fresh, provide us with the most characteristic features. Their apex in the case of *A. karroo* is round as a rule, and their form is shorter; in the case of the two others the apex is mostly acute and their form longer. *A. inconflagrabilis* has even a tendency to be slightly apiculate in its apex, especially in its young state. *A. karroo* can, therefore, even in dried Herbarium material, always be verified with the help of a good magnifying lens by the form of its pinna, which is quite distinct from the two others. Cf. the middle figure. This rule, dealing with the form of the leaflets, cannot be used very strictly but only in an average way, as there are always plenty of exceptions in consequence of shade or varied nutrition. The greatest difficulty facing the taxonomist, who has only Herbarium material at his disposal, is the differentiation between the pinnae of *A. natalitia* and *A. inconflagrabilis*. Although it is quite easy to distinguish the two by the surface of the pinnae in the fresh state, it is much more difficult in dealing with dried material. In the fresh state, the pinnae of *A. inconflagrabilis* are shiny and totally glabrous; those of *A. natalitia* dull, and in the young state, hairy. But *A. inconflagrabilis* turns dull in the plant press like *A. natalitia*, and produces, through its pores, hairlike excretions of gum, which give this totally glabrous species a hairy (hirtella?) appearance in the Herbarium.

In the veld, diagnosis will be assisted by observing that *A. karroo* is a medium-sized tree with a plum tree shape. *A. natalitia*, in pure form, is a slightly taller tree of pear tree shape; whereas *A. inconflagrabilis* is always a shrub of 6—12 ft., resisting the veld fires very well, as its name indicates, and regenerating, even more abundantly, after such catastrophes. The two other species usually succumb to heavy veld fires.

The bark of *A. karroo* is also very distinct, being shallowly fissured longitudinally and rather dark when old, if not black. The bark of the two others is rather smooth, sometimes more or less verrucose, and horizontally furrowed when old. The bark of *A. natalitia*, as stated by E. Meyer, more than a hundred years ago, is light, and that of *A. inconflagrabilis*, dark or black in age. Purely vegetative Herbarium specimens of these two, if already dried, are impossible to distinguish. The collector of *Acacia* specimens should always try to get flowering and fruiting specimens, accompanied by samples of the bark, and filled-in labels and tickets. The tickets should be fixed to every specimen with number and collector's name, written in lead pencil only, so that it cannot be spoilt in the poisoning solution. On the label, the colour of the catkins (which all turn yellow in the plant press) in the fresh state, the habitat or accompanying plants, the soil or geological stratum, the shape of the tree, the height, diameter, the native names (written, if possible, by a native) and the use they make of it, should all be recorded.

II. GEOGRAPHICAL DISTRIBUTION.

A. karroo is distributed throughout the whole Union and South-West Africa, from the Cape Peninsula to the tropical part of Southern Africa, and from the Atlantic to the Indian Ocean.

A. natalitia occurs on the coast, preferring sandy soils, and in the river bushes of the mist-belt area and lowveld. In the latter case, its habitat often overlaps that of *A. karroo*, and I have observed in these areas many cases of hybrids between *A. karroo* and *A. natalitia*. The bark in these cases is usually very dark, but smooth or horizontally furrowed. Inflorescences and pinnulae show intermediate forms as well. *A. karroo*, var. *transvaalensis* Burt Davy and *Acacia hirtella* E. Mey. may belong here. These hybrids are either single occurrences here and there, spontaneously coming up and disappearing again, or well established, local varieties as mentioned above.

A. inconflagrabilis seems, in my experience, only to be found in the midlands of Natal and Zululand in the transition area between mist-belt forests and savannah, e.g. in Nongoma Township, Melmoth, Imfule, etc. The stoloniferous variety of *A. natalitia*, mentioned by E. E. Galpin in his "Botanical Survey of the Springbok Flats," which I have not yet seen in its natural state, may belong to this species.

III. SYSTEMATICS.

1. *A. karroo* Hayne is the best known of these three species of *Acacia* and needs no additional notes besides the remarks already made, and the accompanying figure.

2. *A. natalitia* E. Mey.

For better guidance, I give herewith the original Latin description of E. Meyer, followed by an English translation and additional notes :

"*Acacia natalitia* E. Mey. aculeis geminis stipularibus rectis, erectis, foliis 4—7 jugis, glandulis inter juga omnia, pinnis 12—18 jugis, foliis linearibus, obtusis, glabris, opacis, capitulis pedunculatis axillaribus fasciculatis. Port Natal, Umgeni, 300 ft. Antecedente similis et fructu adhuc ignoto definitu difficilis. Attamen diversam puto cortice albente nec fusco, aculeis saepe brevissimis et vix ullis, numquam 9 lineas longis, rectis quidem, sed erectis, nec divergentibus, foliorum pinnis pinnulisque pluribus, foliis paulo minoribus praecipue angustioribus, apice obtusis quidem sed non rotundatis, opacis nec pallentibus, capitulisque duplo fere minoribus."

Translation into English :

"*Acacia natalitia* E. Mey. with straight, erect, twin thorns ; leaves having 4—7 pairs of pinnae, and between each pair, a gland ; pinnae having 12—18 pairs of pinnulae, which are linear, obtuse, glabrous, dull ; flower-heads pedunculate, capitate, arranged in axillary fascicles. Port Natal, Umgeni, 300 ft. It is similar to the previous species, but as the fruit is not yet known, it is difficult to define. I think it differs, however, in its whitish and not blackish bark, in its spines being often very short or nearly wanting, never 9 lines long, straight indeed, but erect and not divergent. The pinnae and pinnulae of the leaves are more numerous, the leaflets a little smaller and especially more narrow. The apex of the leaflets is, although obtuse, not rotundate ; dull, not pale, and the globose flower-heads only half the size."

When I compare these old descriptions of our *Acacias*, I remember the verses of the old Swiss botanist and poet Haller (after whom his friend Linnaeus named our genus *Halleria*) :

"Cucumber, Aloe, Canterbury bell—
To all the description fits full well."

(Translated.)

Unfortunately, the description of *A. natalitia*, as given by E. Meyer, is based on his two specimen numbers, one collected at Durban, and one at Umkomaas. They are only two incomplete, special cases, and do not

cover at all the whole ontogenesis of *A. natalitia* with all its modifications in different environments and rainfall periods and its variations produced by interbreeding with others species of Acacia like *A. karroo*.

In his remark, "It is similar to the previous one," he refers to *A. karroo*. The fruit of *A. natalitia*, unknown to Meyer, is known to us and is so much like the fruit of *A. karroo* that it offers no good features to be used as a basis for distinctive taxonomy. The same is the case with the size and number of the flowers, the number of the pinnae and pinnulae, and the form and size of the thorns.

More constant features are the different habitats, the shape of the tree, the colour and form of the bark, the inflorescence and its combination as a whole and the form and surface of the pinnulae. Of these important features only the colour of the bark and the different form of the pinnulae are mentioned in Meyer's original description, but are sufficient to identify *A. natalitia* as the distinct species known to us by the Zulu name "umSama". Meyer does not mention that the surface of the bark is smooth and only horizontally furrowed in age, in contrast with *A. karroo*, which has the bark longitudinally fissured. This characteristic is, in my opinion, much more important than his remark about its pale colour, which seems to be only the case in the dry bushveld, whereas in the mist-belt area of Magoebas Kloof in the northern Transvaal, the bark of big trees is smooth, but blackish. The young leaflets of *A. natalitia* are rather hairy. I suspect, therefore, that *A. hirtella* E. Mey. is only a young and local variety or modification of *A. natalitia*, as, during the last twenty years of collecting in Zululand and Natal, I have never seen a specimen clearly distinct from *A. natalitia* and *A. karroo*, which could be named *A. hirtella*.

The descriptions of *A. hirtella* and *A. natalitia*, as given by E. Meyer, differ only in three points. The hairiness of *A. hirtella*; the glands which are between each pair of pinnae, in the case of *A. natalitia*, and only between the first and the last one in the case of *A. hirtella*; and the form of the apex of the pinnulae. These apices in *A. natalitia* are called obtuse, in *A. hirtella* "acutiusculi," i.e. somewhat acute. But as E. Meyer, in his description of *A. natalitia*, stresses the difference between it and *A. karroo*, in such a way that we must assume that the leaflets of *A. natalitia* are more acute than those of *A. karroo*, I cannot see an essential difference between the apices of *A. natalitia* and *A. hirtella*. All these three differences, which E. Meyer believed to exist between *A. natalitia* and *A. hirtella*, are so variable that the conceptions of *A. natalitia* and *A. hirtella* are comprehended in the wider conception of *A. natalitia* which I have gained during my 20 years' collecting in the lowveld of Natal and Zululand.

A final description of *A. natalitia* can only be given if more and better annotated material, as mentioned above, is available, so that all the spontaneous and well-established hybrids can be separated from the pure species. Such a pure stock will probably be found on the beaches of Zululand, where its habitat does not overlap the more inland *A. karroo*.

3. *A. inconflagrabilis* Gerstner n. sp.

A. karroo Hayne et *A. natalitia* E. Mey. affinis nimis. Frutex, circiter tribus usque ad septem pedibus altus. *Cortex* niger, fns. is. multis horizontalibus praeditus. *Truncus* 3—8 cm. diam. *Rami* prope a humo diffusi. *Stipulae* spinescentes. *Spinae* directae, albae, circiter 1 mm. latae basi et usque ad 20 mm. longi permanentes et paululum crescentes per annos tres. *Folia* circiter 9×4 cm. *Foliola* vel pinnae (5)—6—(10) parium, pinnulae 24—28 parium circiter 5×1 mm., lineares, apice acutiusculo paululum apiculato, basi cordata, rugosae et subnitentes. Inter parem pinnarum petiolo brevi proximarum seu remotissimarum nonnunquam sunt glandulae. *Flores* 3—6 in fasciculo axillari, globosi. *Capita* circiter 13 mm. diam., colore luteo. *Flosculi* calice et corolla glabris, lobatis, luteisque (cf. Fig.). *Filamenta* circiter 30, elongata, lutea. *Antherae* minutae, globosae, luteae. *Stylus* alboluteus, elongatus, simplex. *Legumen* fuscum, falcatum, repetitum constrictum, simile legumini *A. karroo*. Magnitudo leguminis variat. *Semina* 10×7 mm. longa vel lata adsunt 3—5 in legumine. *Frons* novella viscosa, glaberrima.

Habitat in the mist-belt area and transition from mist-belt to grassveld and bushveld, from 1,500 to 3,000 ft. *A. inconflagrabilis*, "The Fire-Resisting," sprouts out easily after veld fires. It was especially used by the Zulu king uShaka and others to fence the isigodlo (harem) of their kraals (homesteads). Its standard Zulu name is "isiKhombe". Others are isiKhombo, uSaku, and uGaku. The two latter names are used for *A. Borleae* Burt Davy as well, which has the same shape, glabrous and sticky surface, the very progressive expansion of the laxiflorous inflorescences, and the quality of easy regeneration after veld fires. *A. inconflagrabilis* is always a shrub and about 3—7 ft. high in contrast to its nearest relations, *A. karroo* (in Zulu umuNga) and *A. natalitia* (in Zulu umSama). The last two species grow into trees and inhabit the dry bushveld. *A. karroo*, the most common Acacia in Africa, has of course quite a number of synonymous names, which had to be sunk, e.g. *A. horrida* F.C., *A. capensis* Burch., *A. nilotica* Thunb. and also probably *A. seyal* Delisle.

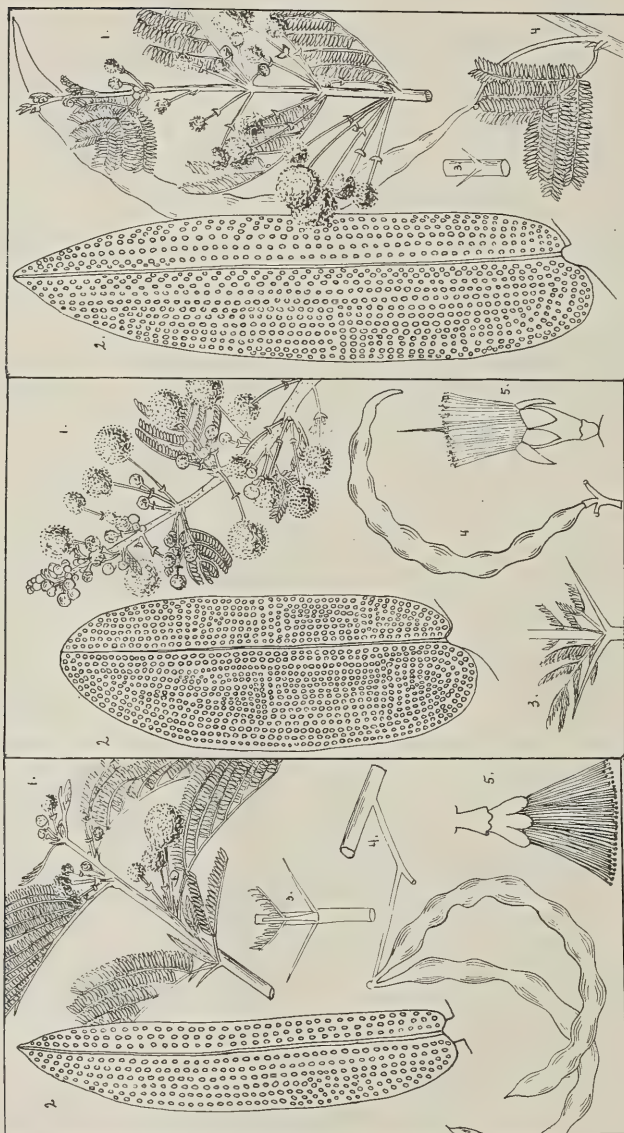
The Sotho tribes do not distinguish these nearly-related Acacias, and call the tree form just "Mookha," and the bushy forms, "Mookhana," in Basutoland itself, "Leokha". The two latter names are only diminutives of the first one.

The Europeans do not distinguish these three closely-related species either. *A. karroo* and its near relations are called in English: "Karoo-Thorn," "Gum-arabic Tree," "Thorn Tree," "White Thorn," "Sweet Thorn," if it is eagerly eaten by stock, and "Sour Thorn," if the stock does not care for it. The name *Mimosa* (Tree) is, of course, an error. In Afrikaans they call these Acacias "Karroodoorn," "Doringboom," "Doornboom," "Kareedoorn," "Witdoring," "Soetdoorn," and "Soetdoring". *A. inconflagrabilis* is probably often called "Sour Thorn" or "Suurdoring," because in the Mist Belt areas, where it occurs, fresh grass is plentiful all the year round, so that cattle would not need to eat such prickly fodder.

The bark of *A. inconflagrabilis*, at first reddish, later turns black, and on the larger stems has small horizontal fissures. The trunk is at the bottom only 2—8 in. in diameter and always branches out near the soil. The stipules are transformed into straight, whitish spines 1—20 mm. long. They remain growing on the stem for three years, a feature which gives this species a very thorny appearance.

The primary leaves are about 9×4 cm. The 5—7 (mostly 6) paripinnate pinnae have 24—28 pairs of pinnulae. The pinnulae are 5×1 mm., linear, their apex acute, or even apiculate, especially if young, and the base cordate. The surface of the pinnulae as seen under a lens is rugose, and the whole frond has a shiny appearance. But it is not so shiny and sticky as *A. Borleae*, which has much smaller pinnulae in addition, and can, therefore, not be confused with any of our three closely related Acacias.

Between either the first or the last pair of pinnae, we often find an oval sessile or stalked gland, which serves to attract plant-protecting sugar ants. The inflorescences are 1—6, axillary, fasciculate, yellow, like the yolk of an egg, globose, about 13 mm. diameter: they more or less replace the secondary leaves of the axillary spurs. In the young inflorescence the involucrel is near the flowerhead, but when the flowers are fully expanded, the lobed involucrel is less than half way from the base of the slender, glabrous peduncle. Calyx, corolla, filaments and anthers (cf. figure) are all yellow. The brown, falcate, slightly torulose (constricted) legume is 80×8 mm. in size, and similar to that of *A. karroo*. The seeds (3—5) are about 5—10 mm., ovate, glabrous, blackish-brown, and shiny.

*Acacia natalia**Acacia karroo**Acacia inconflagrabilis*1, 3 and 4 $\times \frac{1}{2}$. 2 $\times$ c.20. 5 $\times$ c.4

IV. TAXONOMIC SYNOPSIS.

	<i>A. karroo.</i>	<i>A. inconfagrabilis.</i>	<i>A. natalitia.</i>
Shape	plum-tree-shaped	shrub	pear-tree-shaped
Colour of bark	blackish	black when old	light grey
Surface of bark	vertically fissured and peeling off	horizontally furrowed when old, not peeling off	in young state, smooth, more or less rugose, later horizon- tally fissured, not peeling off
Expansion of inflorescence	almost simulta- neous	very progres- sive	progressive
Average size of pinnulae . .	4·5 × 1·5 mm.	5 × 0·75 mm.	5 × 1·4 mm.
Surface of pinnulae . . .	dull	somewhat shiny	dull
Apex of pinnulae	round	acute or more or less apicu- late	acute
Base of pinnulae	subcordate and subsessile	cordate with short petio- lule	subcordate and subsessile

V. SPECIMENS.

Dried material of these three species, verified in the field by the author, has been placed in the National Herbarium, Pretoria, the Natal Herbarium, Durban, the Kirstenbosch Herbarium, the Bolus Herbarium of the University of Cape Town, and the Herbarium of the University College of Pietermaritzburg, viz.

A. karroo : Gerstner 4561, 4634, 4640 ;

A. natalitia : Gerstner 4332, 4526, 4529, 4639 and 5417 ;

A. inconfagrabilis : Gerstner 4562, 4635, 4637 and 5258.